

Propagation Issues for Communications on and around Mars

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Abstract: This paper reports on on-going work at JPL for an in-depth understanding of radio wave propagation issues for communications on and around Mars for cost effective design of future mission for robotic and human exploration of the planet. The study examines signal attenuation and multi path near the surface of Mars for the 0.4 GHz /30 GHz range and considers the impact of these phenomena on communication links between orbiter to rover and rover to base-station. The impact of the Martian environment including the ionosphere, atmosphere, global dust storm, aerosols, clouds, and geomorphologic features on signal attenuation is presented. The study also examines signal multi-path on the Mars surface. The sensitivity of signal attenuation and multi-path versus frequency is studied for the 0.4 GHz /30 GHz range. Research reported by this work is being performed by Jet Propulsion Laboratory, California Institute of Technology under a contract with National Aeronautics and Space Administration in support of the High Rate Data Delivery within NASA's Cross Enterprise Technology Development Program.